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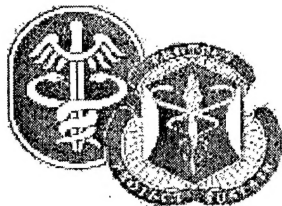
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DHP RFS Final Report



Distance Learning: Has the training culture kept up with the technology available?
Proposal Number: 1999000269

Joseph Francis McKeon MD, MPH

Abstract

Problems

The principal problem encountered in the conduct of this project centered around difficulties developing script- based DL classes from a traditionally didactic style block of instruction. While the instructors at USASAM are facile in platform-based instruction, converting that instruction to the written word, in a fashion that was easily and accurately processed by the student, proved challenging. The process required multiple editing steps, to ensure the lesson was both technically and grammatically sound. This process was time consuming, and competed with the myriad other duties of our busy instructor/writers. The ultimate product was excellent, but the process took considerably more time to execute than originally planned.

One of the major technical issues as far as capturing valid time metrics involved the inability to record data to the hard drives of the computers used in the computer classrooms. These computer resources were not USASAM's, and the DL classroom administrators would not allow new software to be downloaded onto their computers. This resulted in hand-written, best guess estimates of actual time being spent on by individuals on the various computer- based lessons.

There were also some technical difficulties secondary to security issues. Existing firewalls hindered the abilities of the USASAM staff to review CTA developments. This slowed decision making with respect to design choices and clarification of the authors' intent in several of the lessons. USASAM access to products in development improved significantly during the second half of the project, as security issues were successful resolved.

Other technical difficulties were more minor, and were dealt with as the project matured. One of the problems involved anticipating "plug-in" functionality in an off- line environment. This means there was a requirement to download the "Flash" drivers in order to view Flash products off-line via CD. There was a problem with the scrolling text

order to view flash products on-line via CD. There was a problem with the scrolling text fields, and student input led to a satisfactory resolution of that problem. There is still a problem with speed navigation through the classes, and keyboard shortcuts may help mitigate cumbersome navigation issues.

Deliverables

The principal deliverable of this project is information as to the effectiveness of using computer-based lessons to provide distance learning in aeromedical subjects to AMEDD soldiers. Four classes have been studied, with a total involvement of 138 students (91 flight surgeon students and 47 flight medic students).

The principal long-term benefit from this study is the ability to enhance readiness through the timely, effective, and standardized training of aeromedical healthcare providers. The prospective flight surgeon, aeromedical physician assistant, and flight medic will be able to complete training modules from their home station, prior to attending the course. 23 lessons from the US Army School of Aviation Medicine curriculum have been converted into a web-based format. These lessons span the spectrum of topics offered within the curriculum and include: aviation, aeromedical, administration, human factors and operational issues. The availability of on-line distance learning products will allow in-residence time in the courses to be shortened, minimizing time away from patient care, thus improving access to care for patients, due to increased provider availability.

Finally, the previously trained aeromedical clinician who has not recently practiced aviation medicine can be refreshed just prior to deployment, and in dire situations, even during deployment, providing "just in time" training.

Expenditures

	3Q FY 00	4Q FY 00	1Q FY 01	2Q FY 01	
Element of Resource (EOR)	Apr 1 - May 31	Jun 1 - Sep 30	Oct 1 - Dec 31	Jan 1 - Mar 31	TOTALS
Travel 2100	0.00	942.00	0.00	0.00	942.00
Shipping 2200	0.00	1,080.00	0.00	0.00	1,080.00
Rent & Communications 2200	0.00	22,770.32	0.00	0.00	22,770.32
Contract for Services 2500	0.00	172,000.00	0.00	0.00	172,000.00
Supplies 2600	0.00	2,000.00	0.00	0.00	2,000.00
Equipment 3100	0.00	0.00	0.00	0.00	0.00
GRAND TOTALS	0.00	198,792.32	0.00	0.00	198,792.32

Financials

Permission to proceed with the project from the local (EAMC) IRB was obtained on 11 May 2000 (DDEAMC 00-22) and MEDCOM approval (MEDCOM CIRO 2000422) was received on 2 August 2000 (4Q FY 00). Monies were then allocated as follows:

Contract for services of the following personnel:

Database Administrator Web Developer Graphic Artist Multimedia Director
Audio/Video Engineer Network Administrator Data Analyst Finance/Logistics Manager
Assistant Logistics/Budget Technician

Total Obligation for Labor: \$172,207.18

There were minor expenditures for travel and shipping:

Travel \$943.50 (travel to/from Ft. Rucker/Ft. Gordon) Shipping \$1,080 (shipping costs for display at COAP in Norfolk, VA and for shipping computers to Fort Rucker) Misc Supplies and registration fee for web site \$2,000. T-1 communications line was contracted for this project at a cost of \$22,770.32.

Final Results

The results of this study validate that computer-based training is as effective as traditional classroom training for selected aeromedical subjects.

To date this project has tested the efficacy of computer-based training as compared to traditional classroom training for a total of four resident classes. Two classes of enlisted flight medics (total 47 students) and two classes of officer clinicians (total 91 students) for a total of 138 students were studied. There was no statistical significance ($P < .05$) between the students' performance, as measured by a standard written exam, in the computer-based and traditional classes. The breakdown for the classes is included below:

Flight Surgeon Class 1: mean test score for control (didactic) group 89.1% $n = 19$ mean test score for study (computer-based) group 87.6% $n = 26$ (2 students chose to not participate in DL group)

Flight Medic Class 1: mean test score for control (didactic) group 85.2% $n = 13$ mean test score for study (computer-based) group 87.8% $n = 11$ (all students agreed to participate)

Flight Medic Class 2: mean test score for control (didactic) group 78.2% $n = 13$ mean test score for study (computer-based) group 74.2% $n = 10$ (1 student chose to not participate in DL group)

Flight Surgeon Class 2: mean test score for control (didactic) group 79.1% $n = 26$ mean test score for study (computer-based) group 79.7% $n = 20$ control 79.1% $n = 26$ DL 79.7% $n = 20$ (3 students chose to not participate in DL group)

The groups were then totaled by class type with the following results:

A total of 47 flight medic students (26 control and 21 computer-based) have participated in the study to date. The mean score for the control group was 81.7%, and the distance-learning group has a mean score of 81.6%. There is no statistical significance ($p < 0.05$) to the mean test scores between the two groups: Mann-Whitney t-test ($p = .9566$). See Graph #1.

A total of 91 flight surgeon students (45 control and 46 distance-learning) have participated in the study to date. The mean score for the control group was 83.3%, and the distance-learning group has a mean score of 84.1%. There is no statistical significance ($p < 0.05$) to the mean test scores between the two groups: Mann Whitney t-test ($p = .5634$). See Graph #2.

The lack of statistical significance in a group of this size argues against rejecting the null hypothesis that there is no difference between these two methods of instruction, as measured by a standardized written exam.

Projected Costs

The projected costs of deploying this system to the AMEDD, and in fact to the Army in general, depend primarily on the size of the intended audience to be instructed, and the volume of material to be taught. As a minimum, one must consider start-up and sustainability costs, to include equipment and software, as well as the opportunity costs of faculty and information management resources.

Infrastructure, Hardware and Software Costs: The initial start up resources for infrastructure and hardware exist, in at least rudimentary form, virtually anywhere the Army teaches resident courses. All instructors will have PC's and the ability to produce PowerPoint type classes with "Notes". The ability to convert those classes to a computer-based medium suitable for distance learning will require the use of software such as "Flash", an enterprise class server and adequate bandwidth to deliver the product. If the audience to be instructed is large, and includes active duty soldiers accessing the information from a .mil address, as well as Reserve Component soldiers accessing from civilian accounts, it would be necessary to purchase a T-1 line in addition to the military network. One must consider whether or not on-line testing and tracking of student performance is required, as that will require some form of knowledge management system to record and manage successful accomplishment of requisite courses.

Human Resource Costs:

This expense becomes more difficult to quantify, and involves determining the opportunity cost of having instructor/writers work on developing computer-based curricula for distance learning. In addition, the workload placed on information management personnel, or active duty instructors who also perform IM duties must be determined. The costs here will also depend on how sophisticated the existing lessons are, as conversion to computer-based media will be expedited by the instructor who has a highly polished PowerPoint class with the "Notes" version already completed, and ready references to the material from which the course was developed.

It seems reasonable to use this project as a model for deploying the concept to the AMEDD. USASAM teaches Active Duty and RC soldiers, with 4 Flight Medic Courses (avg 25 students) and 3 Flight Surgeon Courses (avg 50 students) per year. The entire \$200K of project money was MIPRed to the Center for Total Access to purchase necessary automation resources (human and capital). The staff at USASAM converted 23 lessons from platform-based to computer-based, (PowerPoint with "Notes") in addition to their regular duties. The lessons were converted to a distance learning suitable medium by the personnel contracted by CTA, and a DL infrastructure was established. Certainly economies of scale could be realized with a central infrastructure utilized by satellite teaching institutions.

The bottom line is it would be reasonable to expect a modestly sized staff of an academic institution to develop an on-line course of 25 hours or less for about a quarter of a million dollars. Each additional hour of on-line instruction should become cheaper, as the learning curve for the staff becomes less steep, and sunk costs for infrastructure pay dividends. However there will be an additional cost (about \$45K per year in a project of this size) to maintain such an effort that must be supported, in order to ensure continued success of the program.

Comments

This project demonstrated the productivity that can be achieved through the symbiotic relationship between a center of excellence such as the Center for Total Access (CTA) and an educational institution such as USASAM. The synergy realized between the two organizations yielded a useful and potentially prolific product from the TATRC "seed money", as well as a significant academic contribution to both the medical and educational fields: computer-based distance learning education is effective for teaching selected aeromedical topics. This has the potential for broad application in the AMEDD and in the Army.

The personnel at TATRC who interfaced with the principal investigator were most helpful. Mr. John Winston should be recognized not only for his expert assistance with any problems, as well as his timely reminders of suspenses, but also for his unbridled enthusiasm for the projects and for telemedicine in general. Mr. Winston's personal involvement and enthusiasm is contagious, and has contributed significantly to whatever success this project has enjoyed. His sense of obligation to effectively use digital resources to project healthcare efficiently and equitably is remarkable, and I applaud his efforts.

Mr. Paul Bartek was also quite helpful with some technical difficulties in submitting the final report on-line, which were probably more due to operator error on the part of the PI than of the system.

I would submit as a suggestion for improvement, some means to facilitate copying electronic submissions so that the investigators can more easily refer back to them at a later time. Printing the screen does not allow script that is not visible in the text box to be printed, thus making it more difficult to refer to. It is, of course, possible to cut and paste a Word document, for instance, but this can be cumbersome, and is not that intuitive.

TATRC Scientific Review

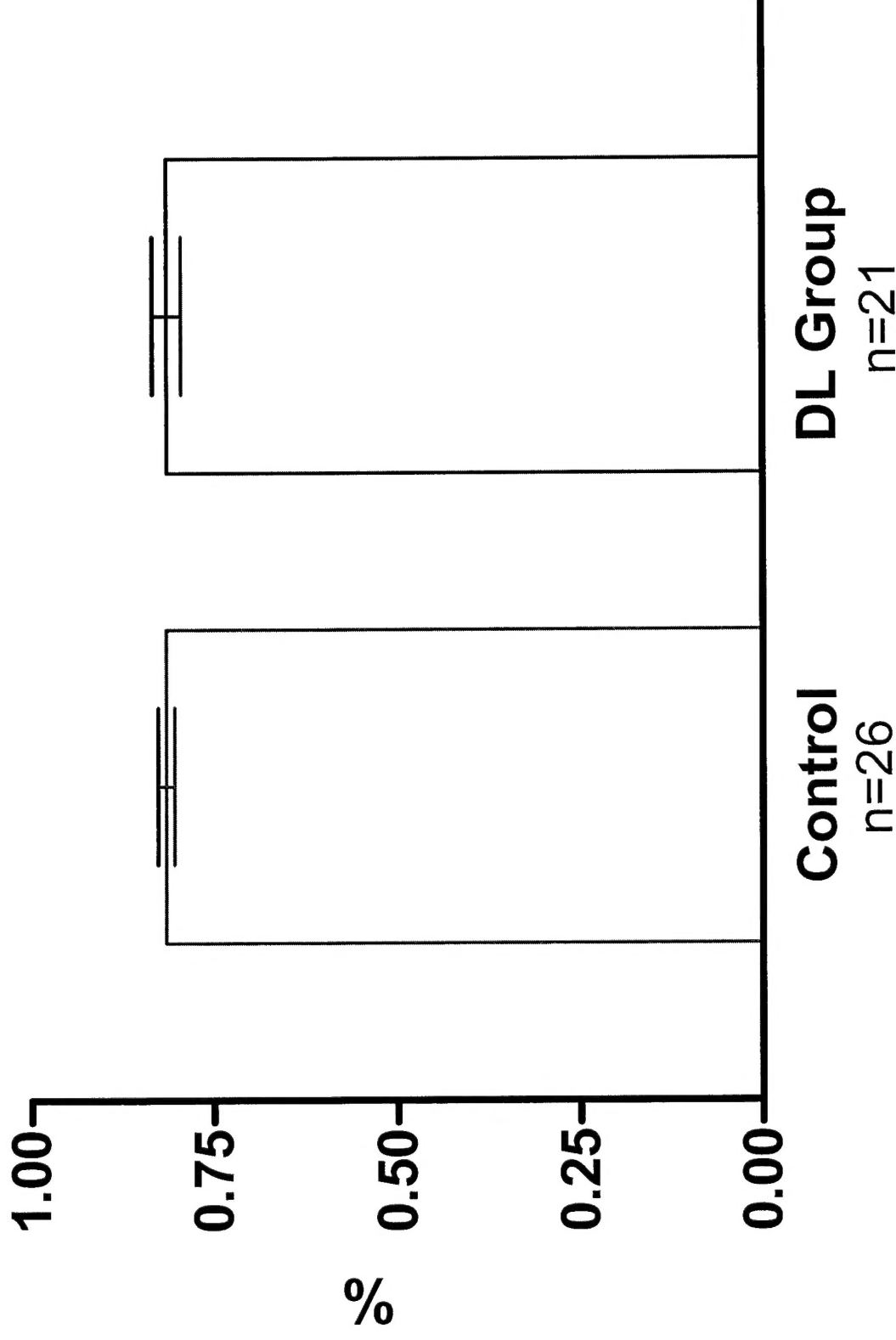
TATRC Acquisition Review

Supporting Graphs/Charts

See Attached

Flight Medic Class Scores

n=47

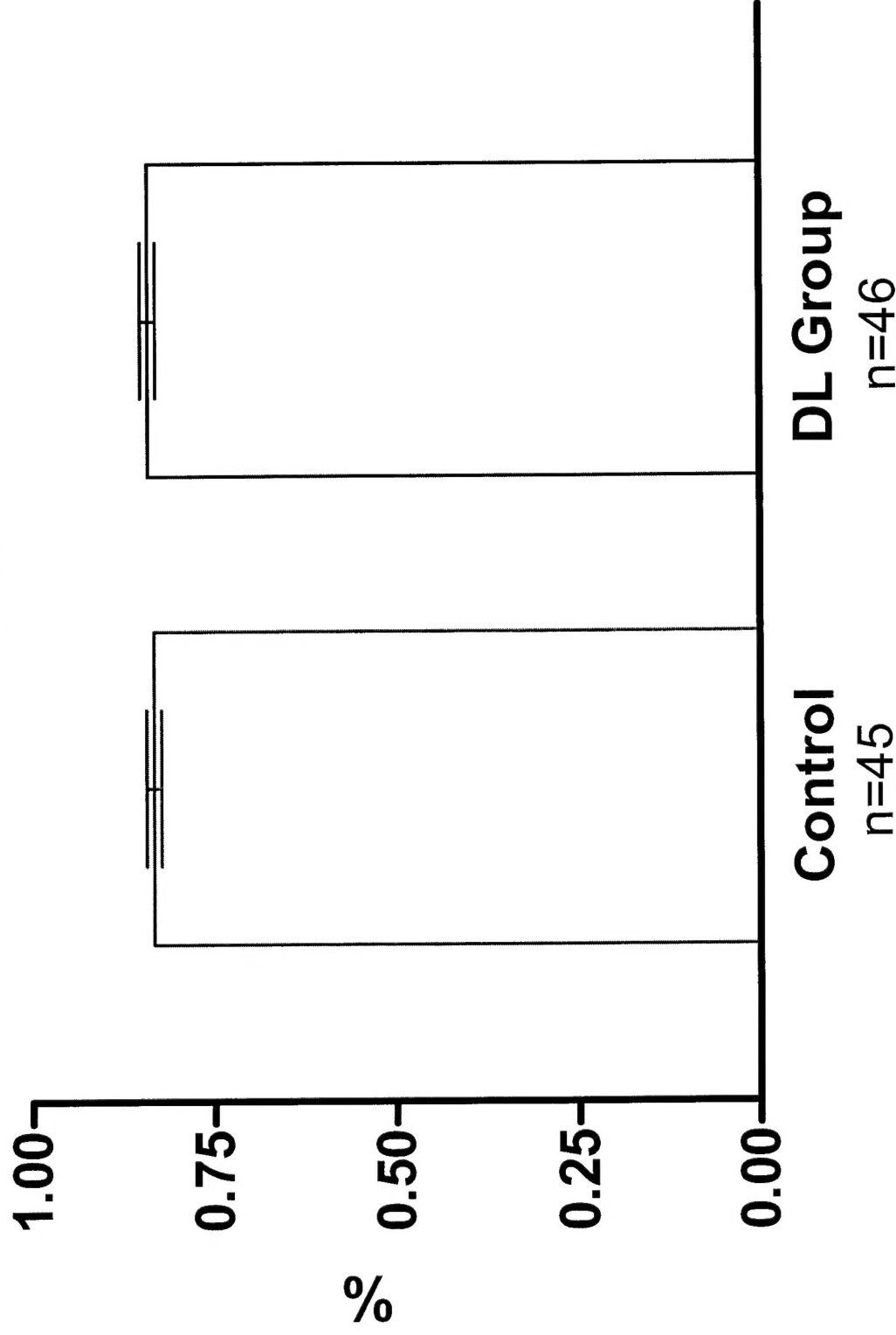


** Mann Whitney t-test (p=.9566)*

Graph #1

Flight Surgeon Class Scores

n=91



** Mann Whitney t-test (p=.5634)*

Graph #2